UNIVERSITY MAGAZINE | SUMMER 2012

carleton

GENERATING IDEAS AND CONNECTIONS

70 WORLD CHANGING IDEAS

Anniversary Issue

Celebrating Carleton's 70th birthday through big pictures, bright ideas, and profiles of groundbreaking research

b. 1942

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Photo: Luther Caverly

The regular *CU Magazine* crew, photographed inside the new River Building on campus. From left: Luther Caverly, photographer, videographer, humourist; Ryan Davies, ideas man, sounding board, boss; Lindsay Ralph, photographer's assistant, stylist, other duties as required; Richard Bootsma, artist, illustrator, prankster; and me, Fateema Sayani. Not shown here but integral to the process: editors Lois Casselman and Roger Bird, and our advisory posse, listed in the masthead at right.

Putting the Pieces Together: Views From Behind the Scenes

The images on the cover of this summer issue are deliberately messy and highly stylized, with hours spent conceiving the idea, gathering the detritus, making it look worn in, putting it all back together, and photographing the elements—all in an effort to look somewhat spontaneous and dog's breakfast-like. It was the best way we could think of to illustrate the process of nailing our theme to your mind—where partially formed ideas and concepts are sketched, resketched, and refined until they make sense—and to get readers thinking about other people's processes and about their ideas.

This issue celebrates 70 ideas coming out of Carleton to coincide with the university's 70th anniversary. Carleton started out on First Avenue in Ottawa in 1942 and became a place to educate men and women coming back from the Second World War. That retraining program was one of the first great ideas, and we begin our list with that story on page 3. We bookend the list with a similar retraining project that is generating job growth in today's tough economic times.

The ideas in between span a wealth of possibilities. Some are multi-year research projects that are idealistic in their world-saving ambition, a few are student projects that may or may not see the light of day (we are intrigued by imagination and potential), and a few are downright quirky.

Some of the ideas are great, each is thought-provoking, and a few of them are world-changing. We went with that term when choosing the main headline for our cover—thinking it was best to oversell a little in a culture that browses quickly before touching down. Fact is, every issue of the magazine concerns ideas, whether in a numbered list or in feature form. The packaging varies depending on the nature of the story. We've covered archival collections in photo essays, featured the research of sabbaticants in tableaux, and told the history of Porter Hall, a one-time campus rock venue, through the recollections of those who slam-danced to the Ramones or sang along with The Pixies.

We take our magazine-making seriously, but we're mindful of not being too precious beyond readability. When faced with this minor dilemma, I often take a cue from my first-year philosophy textbook, *Knowledge and Mind*, written by Carleton professor Andrew Brook and former CU professor Robert J. Stainton, who now teaches at Western University in London, Ont. Sprinkled amidst introductory arguments on epistemology are quotes from "Deep Thoughts," the *Saturday Night Live* skit from the 1990s that featured low-rent philosophy delivered by Jack Handey ("The face of a child can say it all, especially the mouth part of the face.") It's a bemusing foil and a delicious contrast to some of the greater questions of existence. We don't propose to have any of the answers wrapped up in these pages, but we certainly bring up a number of questions about what is possible when sharp, driven minds pursue their curiosities.

—Fateema Sayani

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Carleton University Magazine is published three times a year for the university's alumni, faculty, staff and friends. The magazine is the university's primary vehicle for providing information on the accomplishments of alumni, faculty and students and on significant issues and developments within the university community and the alumni association. The magazine is distributed to 90,000 alumni worldwide.

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Photo: Brigitte Bouvier

Dear Alumni,

Early 20th century French author, R. Mallet, said 'good ideas have no age—they have only a future.' At Carleton University, we are all about the future: the future of our scholars, of society and the world, a future made brilliant through the light of ideas.

Alumni, please join me in thinking back to your days on campus. Do you remember the first snow in the quad? The first daffodils in the spring? Both bookmarked the year along with exams and essays certainly, but above all else, [i] they surrounded that period of your lives filled with the excitement of discovery. As your professors continue to ponder on the meaning of life, search to define the infinitesimally small neutrino, cast their eyes to the farthest reaches of the universe, and design the tools which will improve our existence, they inevitably uncover or rediscover and reinterpret ancient concepts and truths. They will also ideate [ii] or invent new thoughts, new concepts, new ways of interpreting knowledge, new techniques for curing disease, new methods to organize information and new processes, new software, gadgets, widgets and earth-shattering truths. They will inspire yet another generation of students with the desire to make a difference in their own lives and in the lives of others.

A recent issue of the *Harvard Business Review* featured **10** audacious ideas to change the world. I understand that the editors of this journal had difficulty limiting their choice to **70!** Carleton is never short of creativity and energy. The campus fairly hums with excitement as senior students display their projects. The Galleria is crammed with brilliant posters explaining the original research of students who offer to explain their work, eyes shining with enthusiasm and pride. The library is filled with students thirsty for knowledge and wishing for just one more week to learn, forgetting that their lives lie yet before them. Much less do they realize that every day another book, another theory will be published and await their attention!

Carleton celebrates 70 years of thought with this issue of your magazine. Some things never change but Carleton is set on changing the future for the better. Could there possibly be a better reason to celebrate?

Happy Birthday to all graduates!

Roseann O'Reilly Runte
President and Vice-Chancellor

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[i] Yes, even before the Sock 'n' Buskin performance, another Ravens' win or a model UN debate....

[ii] From the medieval Latin meaning to imagine

Photos: Carleton University Archives

EDUCATE VETERANS TO REBUILD THE COUNTRY

The founding of the school was one of the first great ideas. Carleton College started in 1942 as a school offering night courses for academic credit. Things started to ramp up in early 1944. That's when higher-ups in the federal government contacted Henry Marshall Tory, the college's founder, with a novel proposition. The government was looking forward to the end of the Second World War and needed to plan for the re-entry of one million servicemen and women into civilian life.

According to authors Blair Neatby and Don McEown, who wrote *Creating Carleton: The Shaping of a University*, the university program was attractive because it would keep some veterans out of the labour market during a period of post-war reconstruction while improving their skills and qualifications. That sense of purpose intrigued Tory. By the fall of 1944, the school had become a degree-granting institution, hosting its first convocation two years later.

That responsive instinct continues—over the years, the university has developed a number of programs that answer the changing needs of society and the economy, including a technology innovation management program and a bachelor of information technology degree.

Students paid their tuition at Carleton College using cheques received from the Department of Veterans (top left and top right). The early days of Carleton College, circa 1946 (bottom left), when many veterans came to Carleton College still in uniform. Veterans as students enjoy a break from their studies, bottom right.

Eric Sprott photographed in a Dunton Tower boardroom at Carleton, November 2011.

Photo: Luther Caverly

IMAGINE A DIFFERENT PIGGY BANK

Eric Sprott is not high on pension funds. The Toronto-based billionaire investment wheeler-dealer thinks young workers are better off investing money in something other than a corporate pension plan. And, he says, don't invest that money big-time in real estate or other conventional piggy banks either.

Sprott's route to success is gold and silver. He is the number one champion of gold and silver in this country. "Everything I see going on in the world tells me they are going to go higher."

His belief in gold is so strong that he applied to federal regulators last year to establish his own bank, which would make no loans and would allow customers to hold their deposits in gold.

Sprott also says young people might be better off in the long run, financially speaking, joining the workforce right after Grade 12 rather than pursuing a university degree—especially if it results in a general education with no guarantee of the kind of income earned by, say, physicians.

This is not what you heard from your high school guidance counsellor.

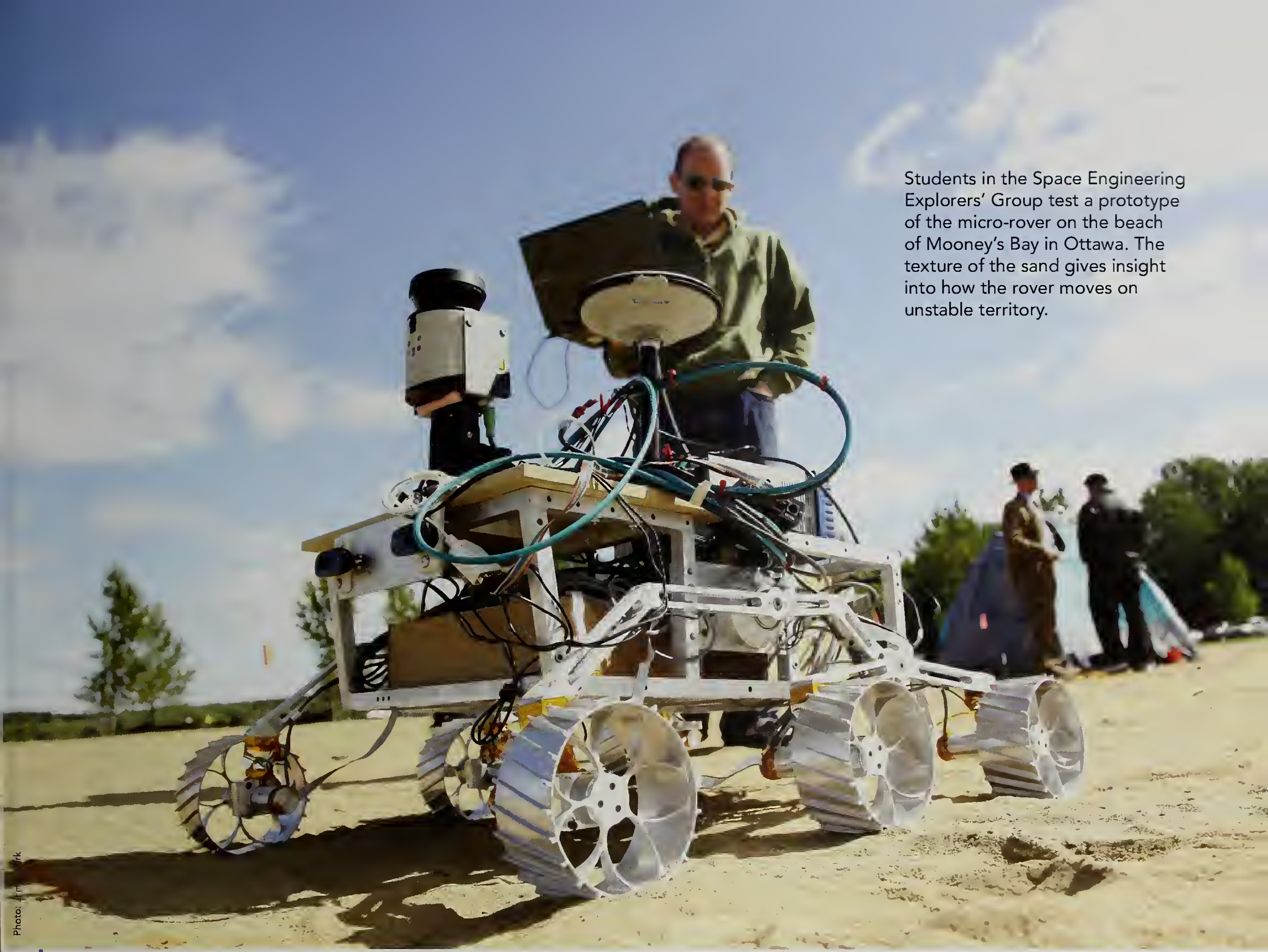
Now, Sprott obviously believes in a university education. His philanthropy paved the way for Carleton's Sprott School of Business, and his name graces a number of programs on Canadian campuses. But he is appalled at the cost of university tuition and the need for student loans.

A high school graduate who immediately starts working—and saving—has the potential to accumulate a bigger retirement nest egg than someone who spends four years racking up student loans in university and then another four years scrimping to pay them off instead of saving, Sprott says. "You may lose eight years of savings," he says. "Eight years of savings at this point in your career is incredibly important when you allow for compounding over 40 years of a working career."

Tuitions have far outpaced inflation, Sprott says, while wages for student summer jobs have shrunk. That fact is part of the reason he's donated to Carleton. His money has gone to student aid—bursaries and scholarships—which helps students make up some of the difference.

Do you like what Sprott says? Do you want to work for him? There are a few things you should know: "Once you get into a business, it's your own ability to use all the assets you have that determines where you're going," Sprott says, "and a lot of that has nothing to do with your schooling per se. It might have more to do with character and personality and intuitiveness."

—Paul Gessell



Students in the Space Engineering Explorers' Group test a prototype of the micro-rover on the beach of Mooney's Bay in Ottawa. The texture of the sand gives insight into how the rover moves on unstable territory.

Photo: [illegible]rk

BUILD A LIGHTWEIGHT, INTELLIGENT ROBOT TO EXPLORE AREAS BEYOND EARTH

Robotic vehicles designed to explore the surface of Mars tend to be big, heavy, and very costly. If they get stuck in the soft Martian sands, missions could fail. That's why engineering students at Carleton have been working on Kapvik, a small rover that could help find the best way forward.

"One of its roles is to act as a scout rover and to pass back information it gathers to the larger, more expensive rover and basically trail-blaze a path," says Alex Ellery, an associate professor of mechanical and aerospace engineering involved with the project.

While it was inspired by NASA's rovers, the Kapvik micro-rover is distinctly Canadian—its name is the Inuktitut word for "wolverine," and it has a similarly tenacious, powerful construction. Kapvik has six wheels and weighs less than 30 kilograms, a limit set by the Canadian Space Agency, which is paying for the project.

A collaboration between industry and academia, Kapvik is undergoing final assembly by MPB Communications in Montreal. Its Carleton-designed chassis can roll right over rocks, and that essential feature should keep it steady when it explores the surface of Mars or the moon in the future.

An on-board winching system allows it to rappel down steep hills, it can deploy a robotic mast to gather samples, and there's a battery of sensors to sniff the Martian "air." Robust on-board computing power will allow it to think for itself more than conventional rovers.

—Tim Hornyak

REIMAGINE BIG-BOX STORES

They're supersized, they're car-dependent, and they add little to a sense of community. They're the brutally utilitarian and profit-driven big-box stores that have come to dominate suburban—and, increasingly, urban—spaces in recent years.

Kendra Spanton, MArch/11, above, thinks we've become inured to their blight, and she wants to challenge that.

"I don't want to say they're ugly," she says diplomatically, "but they've certainly got issues."

For example? "They have sidewalks, but you never see anyone using them," she says. "You're in your car, and when you're in a car, you're not interacting with the community, you don't get to know your neighbours."

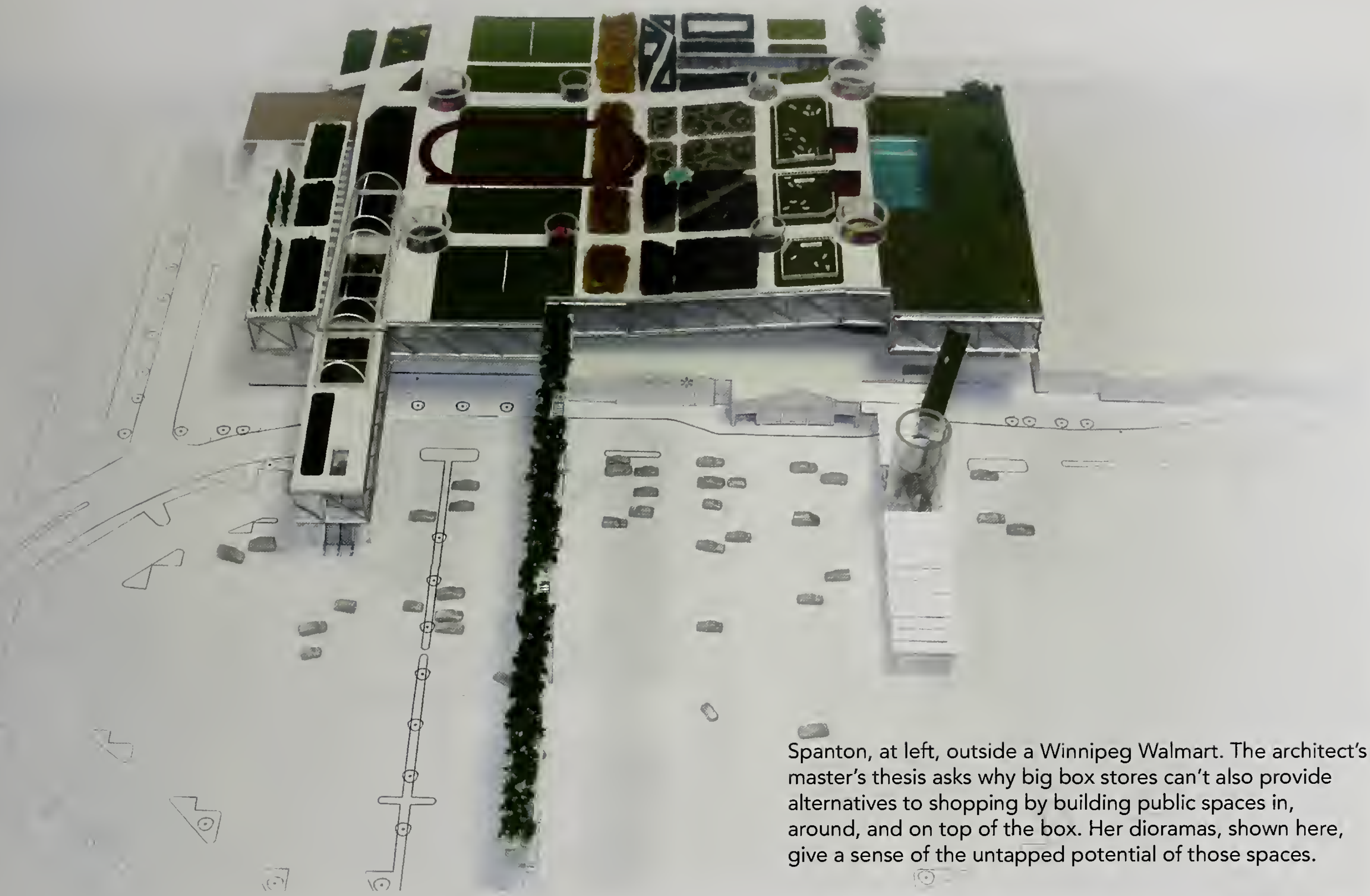
For her master's thesis, *Unpacking the Big Box: Reinterpreting Walmart*, the 26-year-old Edmonton native imagined some of the ways in which big-box stores could be made over to mitigate the bad things they do to communities and the environment.

Her ideas are intended partly as critique, but Spanton says some "are certainly quite feasible." She suggests, for instance, using the hectares of wasted space on big-box rooftops to grow crops or build recreational opportunities such as tennis courts.

"It would be reintroducing some of the original uses of suburban land, bringing some of the ecology back into it," she says.

—David McDonald

Photo: Thomas Fricke



Spanton, at left, outside a Winnipeg Walmart. The architect's master's thesis asks why big box stores can't also provide alternatives to shopping by building public spaces in, around, and on top of the box. Her dioramas, shown here, give a sense of the untapped potential of those spaces.

CHASE YOUR CURIOSITIES IN ONE OF MANY RESEARCH LABS

Carleton University's fascinating, thought-provoking, and sometimes quirky laboratories feature anything from a black jack table to a soccer-playing robot. From humanities to engineering, Carleton researchers are using technology, analysis, and old-fashioned legwork to delve into some of the most compelling—and downright odd—facets of life. We push open the door to find out what they're up to

WRITTEN BY JULIE BEUN

HOTLAB

It's not enough to invent new technology—it has to be designed with humans in mind. That's the intent of the HOT (human-oriented technology) lab, where research reflects design principles of "quality, safety, efficiency, and delight."

GAMBLING LAB

Part lab, part gaming den—it has a black jack table, slot machines, and a virtual casino—the Gambling Lab delves into the dark heart of betting and why it's so addictive.

HYDRO OTTAWA LABORATORY FOR SMART GRID TECHNOLOGIES

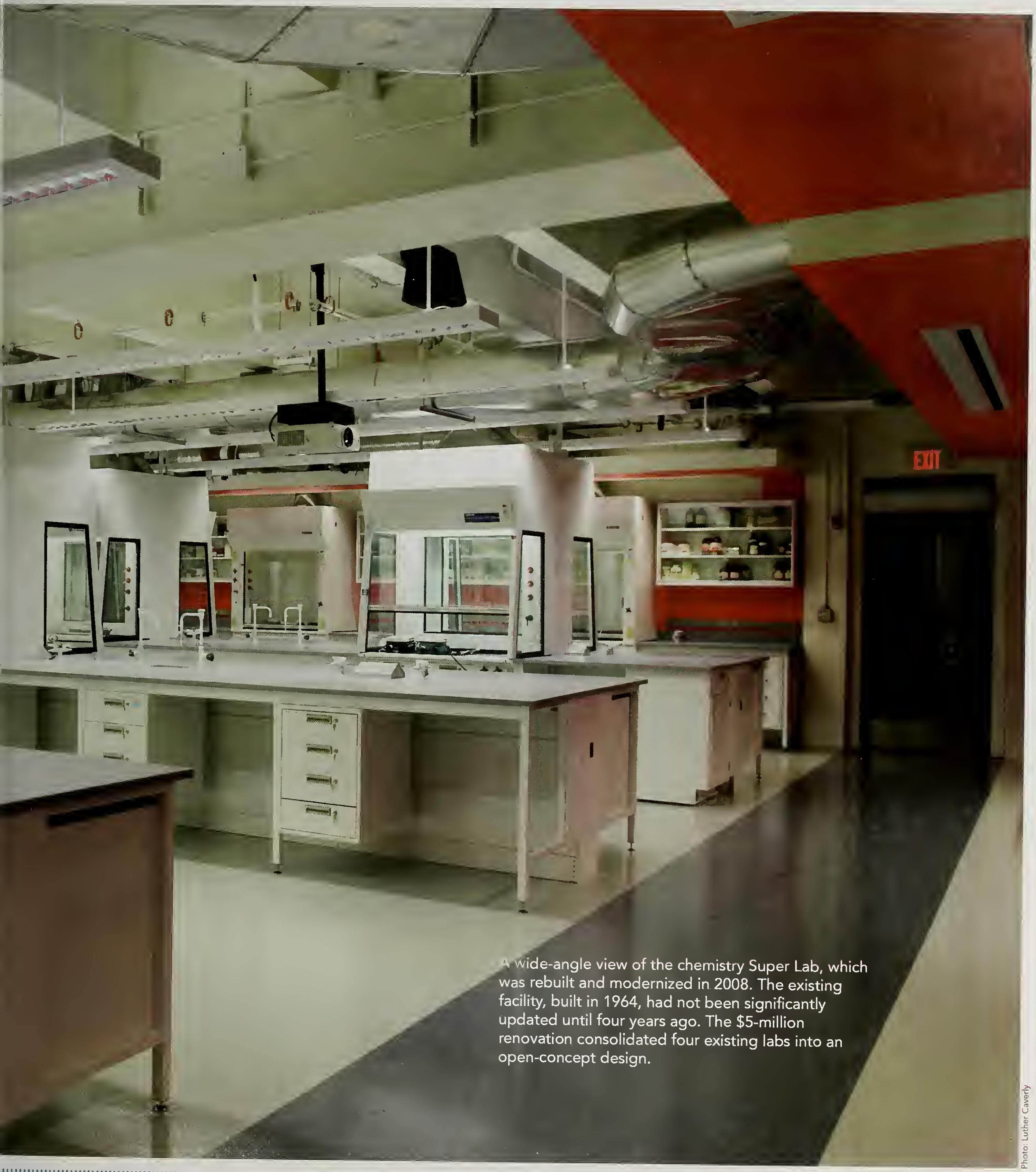
Electricity grid, heal thyself. That's one energy solution at the lab, which focuses on intelligent, renewable, and self-diagnosing electricity infrastructure.

SUPER LAB

The chemistry teaching lab is stunning to look at—and functional. The 6,500-square-foot-space allows up to 120 students to work simultaneously, with full workspaces that include storage and access to a fume hood.

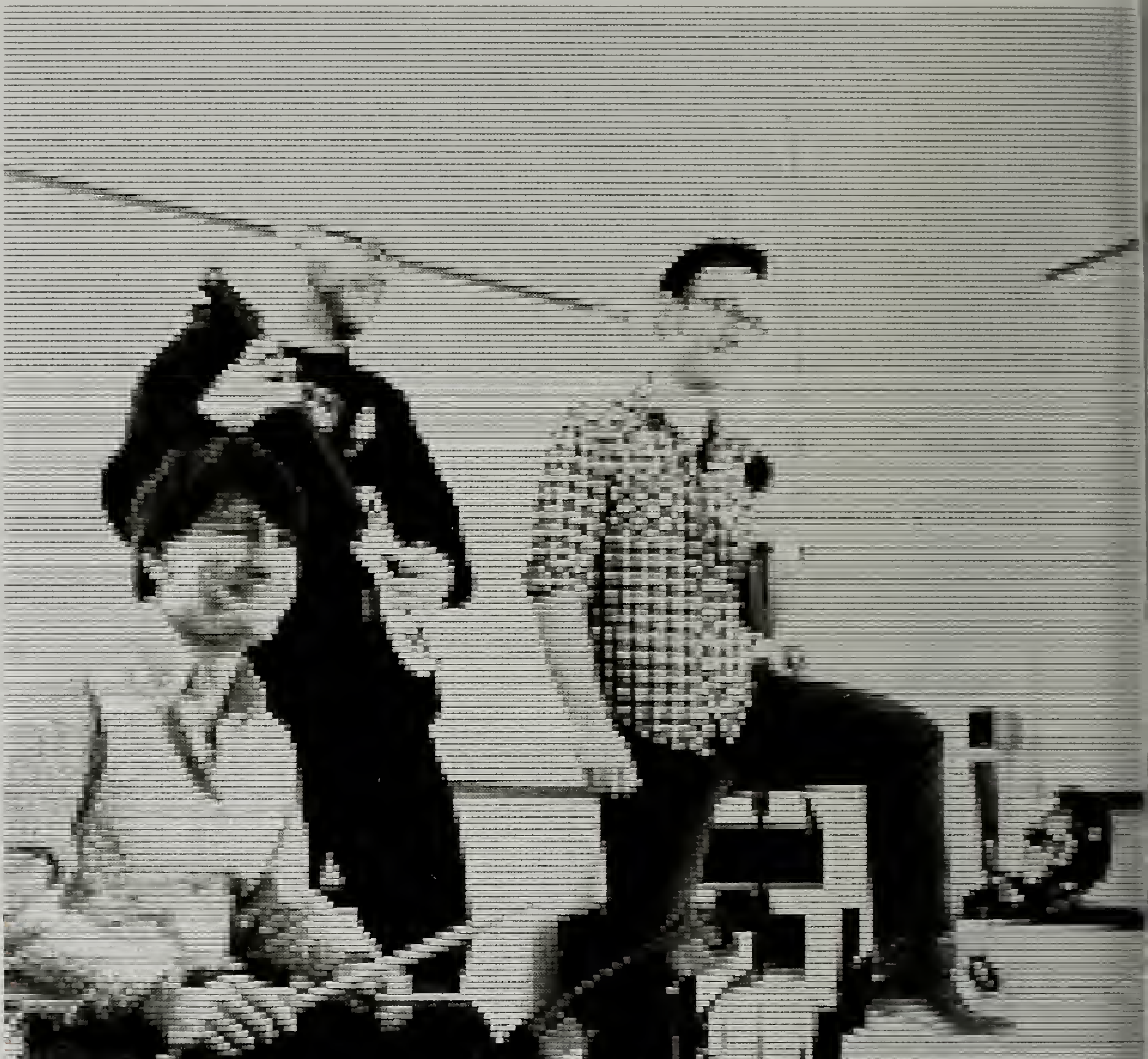
BRAIN LAB

How does the brain process language? Researchers are combining advanced technology, brainwaves, and eye movement to unravel the human mind's unique relationship with words.



A wide-angle view of the chemistry Super Lab, which was rebuilt and modernized in 2008. The existing facility, built in 1964, had not been significantly updated until four years ago. The $5-million renovation consolidated four existing labs into an open-concept design.

Photo: Luther Caverly



HYPERTEXT AND HYPERMEDIA LAB

RU adctd 2 txt? You're not alone. Members of the Hyperlab—Carleton's first digital humanities research centre—examine the role of texting, gaming, digital theatre, and new media cultures.

Phil Horwitz, MA/11 (with microphone), doctoral candidate Adam Benn, and hyperlab director Brian Greenspan, seated, inside the Hypertext and Hypermedia Lab at Carleton. They're shown here in a twinned spread in front of a smart board with gaming equipment. It's not all fun and games—lab members focus on narrative and new media cultures through the study of ever-evolving online environments.

Photo: Luther Caverly

Photo: Luther Caverly

Psychology professor John Zelenski in a testing area that is part of the Happy Lab at Carleton University. The lab focuses on a number of research projects, including an examination of how emotion states, such as sadness or joy, and emotion-related traits, such as extraversion or neuroticism, influence judgment, memory, and other cognitive functions.

SPEECH PROCESSING LAB

That moment when an infant recognizes a word is one of the threads examined at the lab, which also looks at phonetics, audiometric testing, and how word recognition changes with development.

HEALTHY RELATIONSHIPS LAB

Bullying is a hot-button topic across Canada and at the lab, where social violence in close youth relationships—as well the behaviour surrounding anger, jealousy, and aggression—are studied.

CHILDREN'S REPRESENTATIONAL DEVELOPMENT LAB

A plastic star versus one twinkling in the sky: How children link the representation to the reality is central to research here, which also focuses on developing executive function and numeracy skills.

NETWORK MANAGEMENT AND ARTIFICIAL INTELLIGENCE LABORATORY

Computers that talk to each other and artificial intelligence software that can help robots play soccer are just some of the things investigated by this lab.

HAPPY LAB

"Don't worry, be happy" sounds easy enough, but the Happy Lab also looks at the complex interaction of personality, well-being, emotion—and even nature—on our mental state.

NEUROCOGNITIVE IMAGING LAB

Using a 32-electrode system to measure scalp activity and photos of everything from violence to food, researchers are determining how the brain processes stimuli.

GEOMATICS AND LANDSCAPE ECOLOGY LAB

From bird count populations to amphibian environments, researchers here use geomatics—a term for the mathematical analysis of data—to model and map natural habitats.

AVIATION AND COGNITIVE ENGINEERING LAB

What do aging pilots and distracted drivers have in common? The lab looks into both of these scenarios to discover how the design of human-machine-interacting systems, such as heads-up displays, might be influenced by cognition.

IMAGINATION LAB

Artificial intelligence software that visually replicates what you're thinking—that's the future at the lab, which uses experimental and computational methods to recreate visual imagination.

MATH COGNITION LAB

2+2=4. But how do children understand that, and what can they do with it? The lab examines the cognitive process involved in numeracy and mathematical skills.

Engineering student Owen Roberts inside the flight simulator pit. The project, in its 11th year, combines the work of students in engineering, psychology, and computer systems and is used to train pilots.

Photo: Luther Caverly

MAKE A BETTER FLIGHT SIMULATOR FOR SAFER SKIES

The motion of most flight simulators is more like that of a rocking chair than an airplane. That's fine for simulating a flight where the most severe event is a shortage of Diet Coke. Not so good for training pilots to regain control in actual emergencies.

"It's one thing to push some buttons in a cockpit. It's quite another to do it while you are spinning," says Metin Yaras, chair of Carleton's department of mechanical and aerospace engineering.

The goal of its Simulator Project is to create a more realistic flight experience. The simulator's spherical cockpit was designed so that there are no restrictions to movement. It will go up, down, forward, backward, and side to side and will spin in any direction. Its visual system projects images onto spherical surfaces, as opposed to the flat displays of most simulators, further enhancing realism.

More than 200 engineering students have contributed to the project, facing many challenges in the decade since its inception. Finding space for the 4.3-metre-tall structure meant digging a pit in a lab. Students had to write their own software, manufacture their own parts, and design a system of sensors and cameras to track the cockpit's orientation.

"Another major challenge is that, because the cockpit can spin, we can't have any mechanical attachments to it for power, data exchange, or ventilation," says engineering professor Robert Langlois, the project manager.

Construction of the simulator began last September and should be completed within two years. "If it does everything we think it can do, it will have all kinds of applications," says Langlois, who envisions it being used in education, for research, and to train commercial, military, and aerobatic pilots.

Better simulators make for safer skies. So does the experience gained by the hundreds of student engineers who worked on this project, says Langlois. "The contribution to the simulation industry goes far beyond this simulator."

—Roger Collier

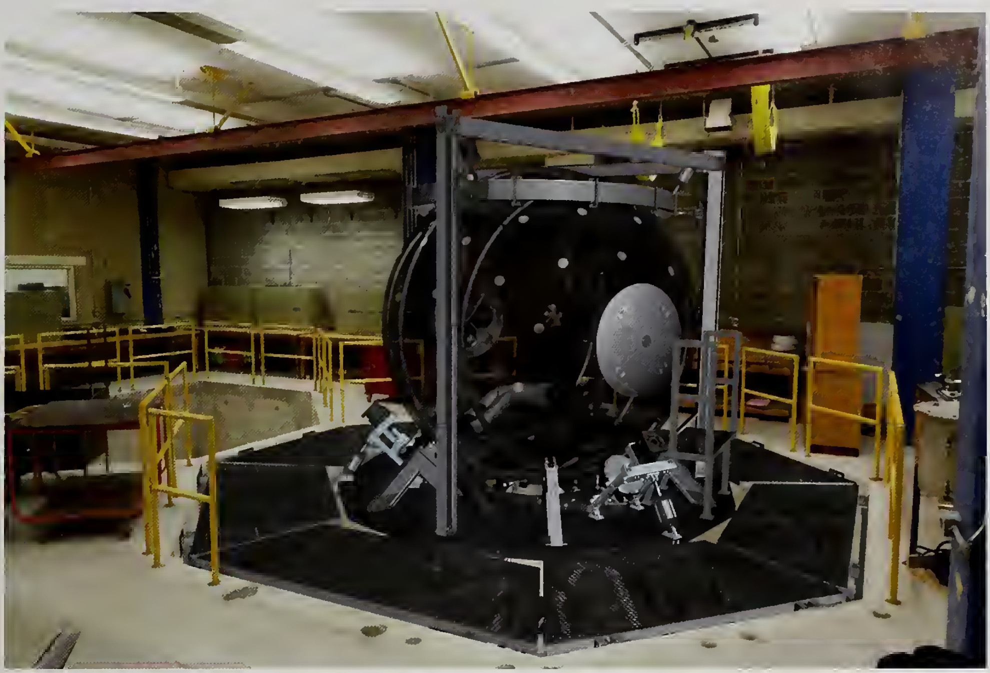


Photo: Rob Williams

This computer-designed model of the simulator is overlaid on a background photo to give designers a sense of the final appearance of the simulator. The pilot enters through one of two hatches located on either side of the seat, then sits inside the sphere facing a screen with a projected image. Located inside the sphere are the projector, lights, sensors, and batteries to power internal systems. Since communication between the pilot's computer and the external command console is wireless, the sphere can rotate without limit in any direction.

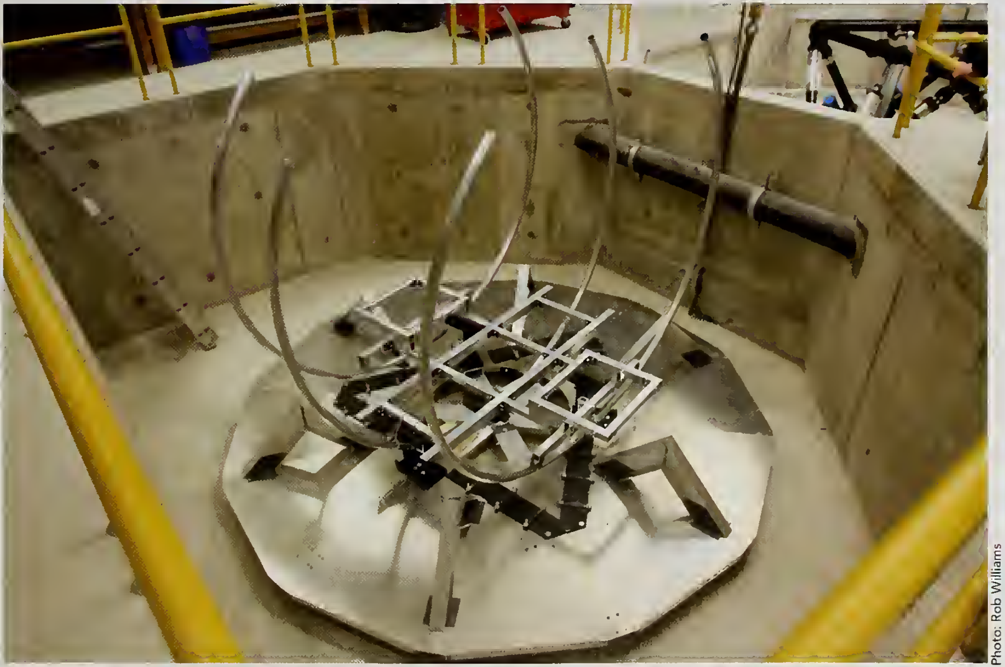


Photo: Rob Williams

Down in the flight simulator pit is a test fitting of various parts that engineering students built during the past academic year. The triangular support pieces form a cradle for the sphere that sits atop the motion base. The skeleton ribs are mounted onto the frame of the sphere floor, allowing the cockpit to be secured.

MacLaren in his Montreal dining room with various bits of evidence of a healthy Canadian publishing industry.

Photo: Jamie Kronick

LOOK BACKWARD TO CRAFT A COPYRIGHT BOOST FOR CANLIT

"The more we know about the issue of copyright in the last century, the more we can decide where copyright should go," says Eli MacLaren, a Banting post-doctoral fellow with Carleton.

MacLaren has spent years researching the impact of early copyright laws on Canadian literature. He has reached only as far as the 1920s, with much still in front of him, but he has seen enough of the years right after Confederation to conclude that the Canadian government and its British overseers failed Canlit badly.

The copyright regime instituted back then discouraged Canadian publishers from reprinting foreign books. That so weakened the industry that Canadian authors tended to go abroad to publish their books. Example: Lucy Maud Montgomery went to Boston in 1908 to publish *Anne of Green Gables*. We still feel the effects of those mistakes.

"We probably would have had a richer literary culture if publishing had been stronger," says the Montreal-based MacLaren, who is an assistant professor at McGill, on leave to pursue the fellowship.

By the 1920s, Canadian nationalism was growing, authors had become more determined to publish at home, and a small press industry had emerged. Today, most small domestic presses publishing Canadian authors survive only with government subsidies.

While the home industry is wobbling along, it faces constant new challenges from multinational corporations and Internet-based technological advances that are radically changing the industry worldwide. MacLaren says legislators reforming copyright laws must be cannier than their forebears to ensure that the Canadian interest is protected and home-grown literature flourishes.

—Paul Gessell

USE HIP HOP TO LINK WITH THE PAST AND TO DEFINE THE WAY FORWARD

Decades after it emerged from New York's Bronx and was dismissed as a fad, hip hop generally still gets a cold shoulder from the academic establishment. Nobody knows for sure whether this is because of its mainstream popularity or perhaps its African-American origins.

That uncertainty struck a chord with Juno-winning Carleton music professor Jesse Stewart, who wrote a pioneering paper in 2010 for the *Black Music Research Journal*. The paper was titled "DJ Spooky and the Politics of Afro-Postmodernism."

Stewart says the tidal wave of academic writing on postmodernism has focused on European cultural forms, so his use of the term "Afro-postmodernism" was intended to encourage analysis of how work from African diasporic communities related to the "slippery rubric of postmodernism."

Stewart wants his work to bring attention to music that's often "ignored by elite-supported cultural institutions—including universities."

"I would be hard pressed to think of any work that exemplifies my conception of Afro-postmodernism better than that of DJ Spooky," Stewart says, adding that Fishbone, Meshell Ndegeocello and the early '90s theatre troupe Pomo Afro Homos also embody the concept.

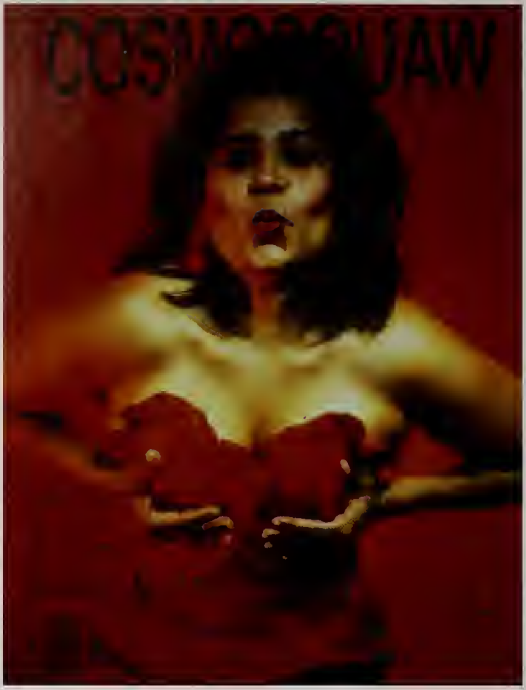
Spooky's use of hip-hop sampling and remixing in multimedia projects like his Klan film *Rebirth of a Nation* offers a politicized postmodernism unique to the African diaspora, Stewart says.

He is convinced that hip-hop pastiche techniques act as "strategies of identity formation that remember and honour the musical and cultural past, while at the same time working to construct visions of a better future."

—*Joshua Ostroff*

Photo: Giancarlo Minelli

Professor Jesse Stewart, left, photographed inside the Karsh-Masson Gallery in Ottawa late last year, as part of an exhibit of his work. DJ Spooky, above. His sampling and remixing offers a "politicized postmodernism unique to the African diaspora," Stewart says.



Lori Blondeau. *COSMOSQUAW.* Duratrans backlit photograph, 1996. From the John Cook collection.

USE ART TO UNLOCK STEREOTYPES AND ROAST CANADA'S COLONIAL IMPERATIVES

At a glance, they're just a pair of heels. Platforms, actually, neatly decorated with some sort of native-themed embroidery.

But ask Julia Pine, BA/02, PhD/09, above left, about them, and she can't help herself. "Oh, they're wonderful," she says, giggling. "They're by Kent Monkman. Do you know his alter ego?" She pauses to recover. "Hmm. A very flamboyant drag queen—channels Cher in her Indian princess phase. She's called—," Pine hiccups out a guffaw, "Miss Chief Eagle Testickle. It's completely over the top."

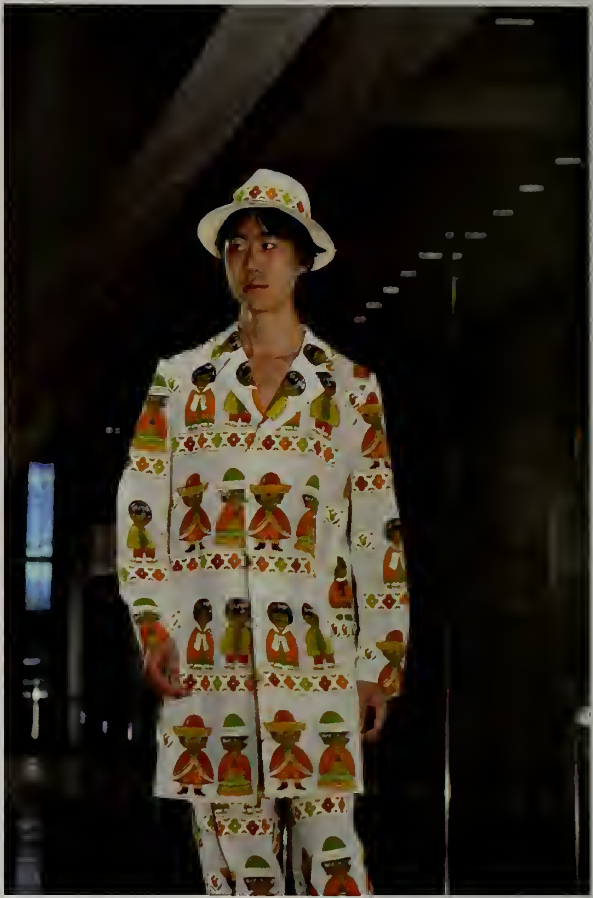
No more so than the company Monkman's work keeps in *Fashionality: Dress and Identity in Contemporary Canadian Art*, a diverse and fascinating exhibit that Pine is curating this summer at the McMichael Canadian Art Collection in Kleinberg, north of Toronto. Spanning four distinct themes and involving 23 Canadian artists—including KC Adams, Janet Morton, and Camille Turner—the exhibit tackles the intersection between fashion, nationality, and personality—or "fashionality."

It's a big idea to cover, but Pine says she was astonished by the scope of activity by artists responding to apparel not only as fashion but as cultural affinity, statement, hybridity, and activism. As such, hundreds of tiny sweaters knit by Michele Karch-Ackerman to commemorate First World War soldiers sit well with Nicole Dextras' astonishing frozen gowns that nod to equally harsh Canadian realities. Performance artists like Mary Sui Yee Wong pointedly unravel stereotypes by creating clothes from kitschy '70s fabrics featuring Indian chiefs. So, too, does Lori Blondeau, whose *Cosmosquaw* image is at once mocking, self-referential, and defiant.

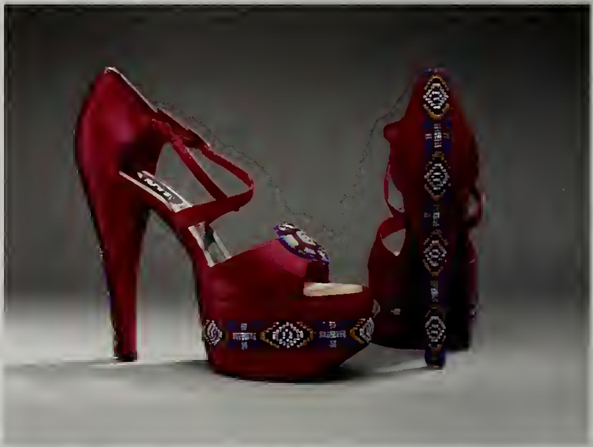
"Clothes are employed in diverse ways," explains Pine, "as sculptural or aesthetic objects, as markers of culture, history, pride, or oppression, but also as a means of re-visioning or 're-dressing' these things."

In the end, she adds, where fashion and art meet is "really a storytelling medium. It's about identity—particularly Canadian identity."

—*Julie Beun*



Mary Sui Yee Wong. *Yellow Apparel.* Performance still from an ongoing multimedia project, 2004 – present. Collection of the artist.



Kent Monkman, *High-Heeled Moccasins.* Machine-loomed beads on vinyl shoes, 2007. Collection of the artist.

Winnie Ye outside the clean lab at Carleton University. The microfabrication room is where researchers work on chip technologies.

Photo: Luther Caverly

BUILD TECHNOLOGY TO SPOTLIGHT DISEASES THAT ARE LURKING IN THE ATMOSPHERE

Among the infectious diseases that challenge public health officials are naturally occurring outbreaks of avian influenza, hospital-acquired infections, and drug-resistant tuberculosis. Add the menace of deadly bio-agents—such as anthrax released by a lunatic or terrorist through the mail or the accidental escape of smallpox from a medical school—and the need for rapid detection and control becomes evident.

Enter Winnie Ye, BEng/00, PhD/07. She is the Canada Research Chair in nano-scale integrated-circuit design for reliable opto-electronics and sensors.

With funding from the federal and Ontario governments, she is developing a sensor for bio-agents in the atmosphere. Ye's nano-sized receptors are designed to provide real-time detection using emerging plasmonic technology, which bridges the gap between photonics and electronics.

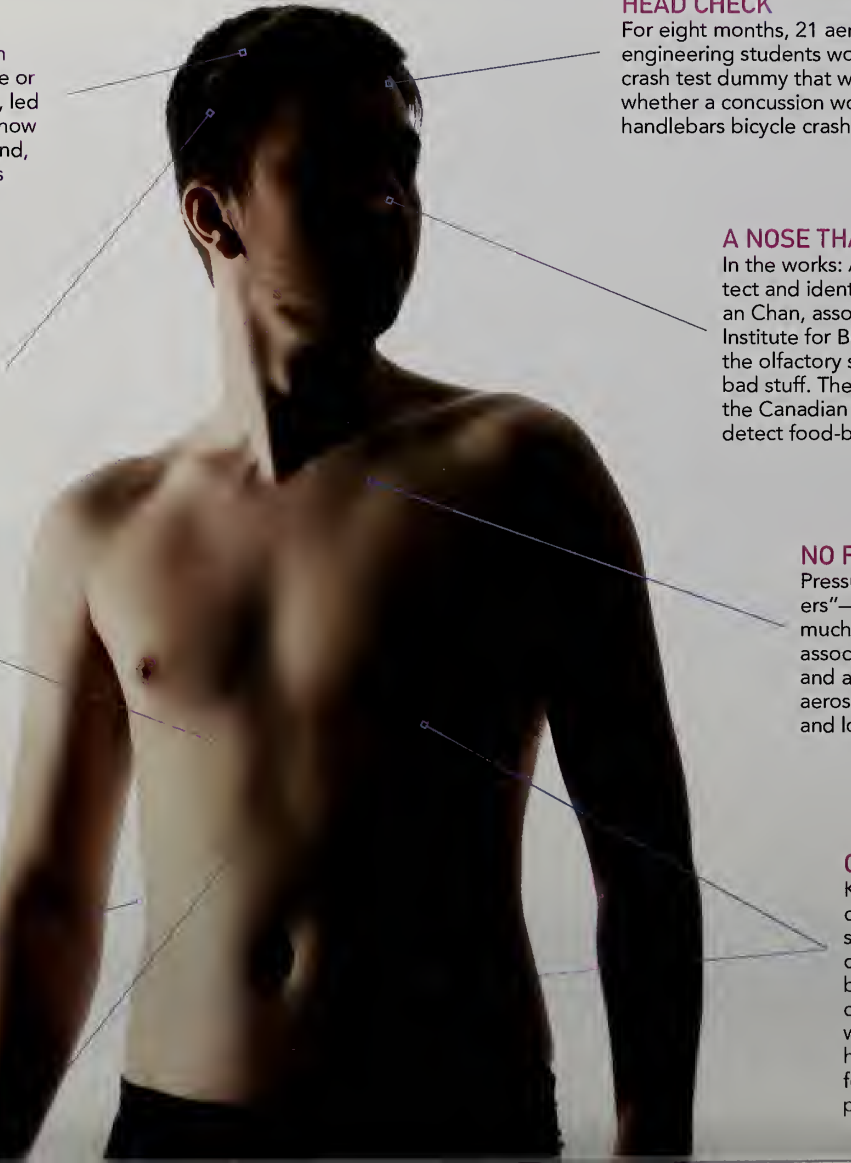
When the protein or DNA molecule of a particular disease comes into contact with the sensor's metal nanostructure, its electromagnetic response produces an optical signature. With an array of receptors—each ready to detect a particular signature—the sensor can detect even tiny concentrations of bio-agents. Once an agent is detected, on-chip wireless transmitters can warn authorities of the location, type, and severity of the contamination.

Ye's compact sensor is solar-powered and low-maintenance, so it can be used in settings from hospitals and bio-labs to airports and train stations. Its low cost and self-sustaining features make it suitable for developing countries and remote or humanitarian operations.

—Amanda Couch

DO A BODY GOOD

RESEARCHERS IN FIELDS THAT RANGE FROM BIOMEDICAL ENGINEERING TO PSYCHOLOGY HAVE PROJECTS IN THE WORKS THAT CAN IMPROVE OUR BODIES AND OUR WELL-BEING. DETAILING SOME OF THE DESIGNS IN A DOUBLE-PAGE BODY GRID



STRESS TESTS

Academics at the Centre for Research on Stress, Coping and Well-Being at Carleton focus on how stressful events can promote or exacerbate pathological states. The team, led by Professor Hymie Anisman, also assess how the brain influences the immune system and, conversely, how immune activation affects brain functioning.

BRAIN GAIN

Stephen Fai, director of Carleton's Immersive Media Studio, leads a team that looks at brain lipids and the role they play in degenerative diseases such as Parkinson's and Alzheimer's.

LUNG TARGET

Physics student Marc Chamberland has a prototype to increase the accuracy of radiation beams targeted at cancerous tumours in the chest. Lung tumours are constantly moving as the patient breathes. The prototype tracks the motion to improve treatment.

BACK SUPPORT

Hanspeter Frei, a professor of mechanical engineering, along with Luke Duross, BEng/10, has started work on a small screw—think of it as being almost like a drywall anchor—that can be inserted into the lumbar spine to provide support for people who've lost mobility and back strength because of osteoarthritis. Modifications are being made to the screw to ensure that it's less invasive to surrounding soft tissue.

HEAD CHECK

For eight months, 21 aerospace and biomedical engineering students worked together to create a crash test dummy that would allow testers to find out whether a concussion would result from an over-the-handlebars bicycle crash in various scenarios.

A NOSE THAT KNOWS

In the works: An electronic nose that can rapidly detect and identify bacteria. The project is led by Adrian Chan, associate director of the Ottawa-Carleton Institute for Biomedical Engineering. E-noses mimic the olfactory system by using sensors to sniff out the bad stuff. The project, launched in partnership with the Canadian Food Inspection Agency, could help detect food-borne illnesses such as listeria.

NO FAIL INHALE

Pressurized metered dose inhalers—or "puffers"—were developed in the 1950s, and not much has changed since then. Edgar Matida, associate professor in the faculty of mechanical and aerospace engineering, researches how aerosol medication is delivered to the lungs and looks at ways to improve the process.

ORGAN PRESERVATION

Ken Storey, a professor of biochemistry, biology, and chemistry, studies animals that hibernate during winter by lowering their body temperature in order to discover how to freeze human organs without harming them. This means hearts and livers can be preserved for longer periods of time for transplant operations.

BREATHE EASIER

Technologies that monitor pulmonary function don't always deliver accurate information on a timely basis. Andy Adler, Canada Research Chair in Biomedical Engineering, is working on a low-cost monitoring system that is portable and can provide accurate data quickly to doctors trying to determine why a person isn't breathing properly.

UTTER NERVE

Work by Carleton neuroscience professor Patrice Smith could repair damaged nerves. Smith, along with colleagues at Harvard University in Cambridge, Mass., discovered a specific molecule in the central nervous system that suppresses our ability to repair injured neurons. Inhibiting this molecule, known as Socs3, might make it possible to repair an injured nervous system.

TUMOUR TREATMENT

Too much radiation can harm a cancer patient, and too little radiation can be ineffective in treating tumours. Professor Dave Rogers, who holds a Canada Research Chair in Medical Physics, studies means of calibrating radiation treatments to make them more effective.

HIP CHECK

FAI, or femoroacetabular impingement, is a common cause of hip pain. Chris Joslin, an associate professor in the school of information technology at Carleton, is dealing with this common orthopaedic problem by looking at methods to simulate the interaction between the socket and head to make more accurate computer-aided surgical plans.

LEG LIFT

A new robotic device invented by mechanical engineering doctoral students Richard Beranek and Ali Morbi is designed to help patients leave hospital two to five days sooner—and help hospitals save money. GaitEnable lifts patients out of bed, supports them while they walk, and stops them from falling.

Photo: Luther Caverly; Model: Sasha Vreca

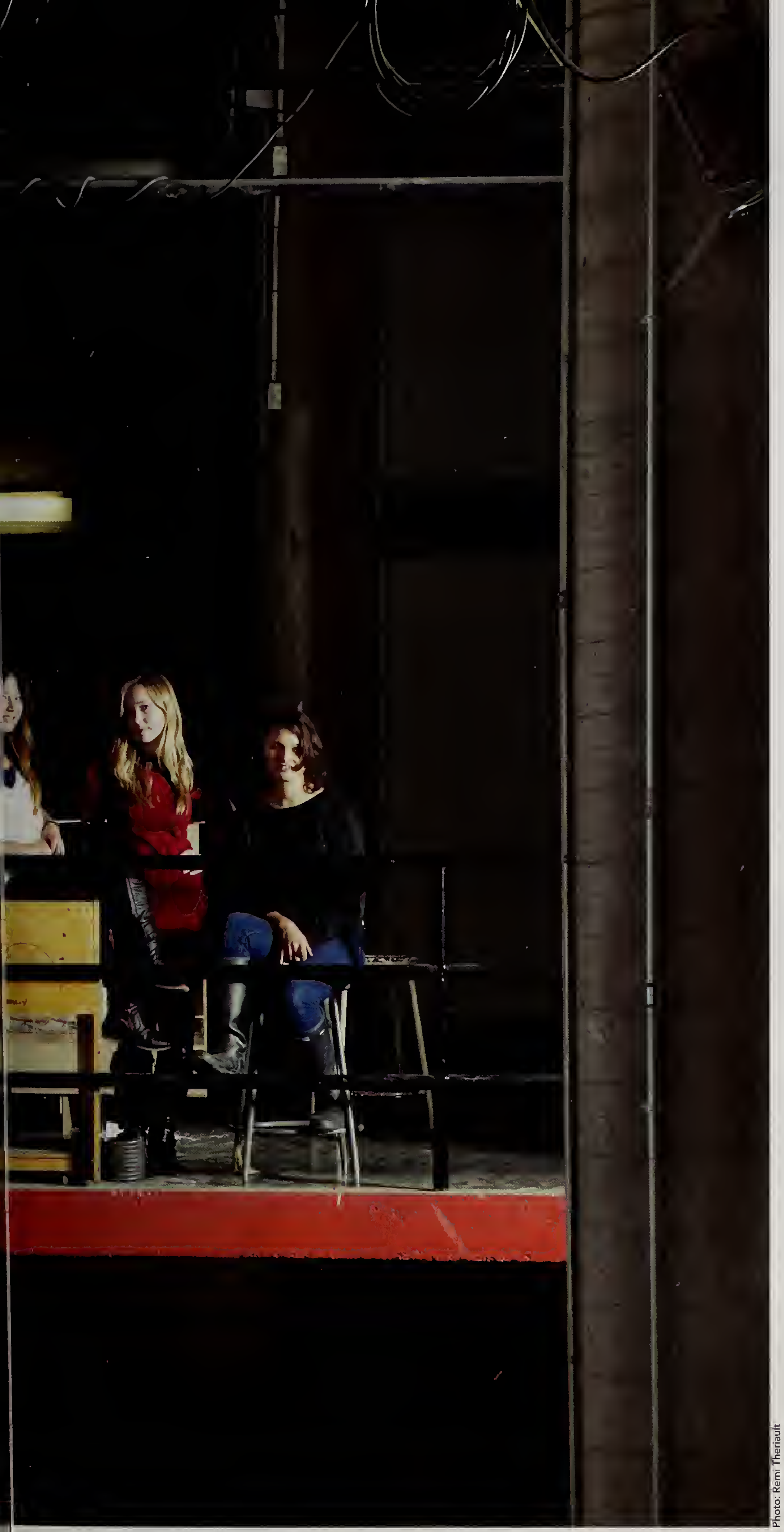


Photo: Remi Theriault

SWITCH UP THE INFRASTRUCTURE MODEL TO HELP CLEAN UP SLUMS

Third World cities could improve the lives of their poorest citizens by locating more services in outlying slums rather than in the urban core.

Municipalities in the Third World tend to locate services in the centre and then slowly move them outwards to what are often much poorer but faster growing areas.

Shelagh McCartney, an assistant professor in the Azrieli School of Architecture and Urbanism, says that doesn't work for outlying slum communities and often duplicates services already existing in the city core.

McCartney has taken her students in the urbanism on the peripheries course to Pilar, a municipality of about 230,000 near Buenos Aires in Argentina, to provide new ideas about services and infrastructure to the local government.

One suggestion: Build a vocational school in one of Pilar's outlying slums. The school would provide a badly needed educational facility to that poor area and attract outsiders interested both in taking the school's courses and in doing some shopping.

Another idea is to focus more on building bike paths instead of roads. The bike paths would lead people to bus and train stations, reducing the need for cars to commute to work.

The Carleton students have looked at designing everything from locally based sewage and flood control systems to parks tailored to the needs of the people who live in Pilar's slums.

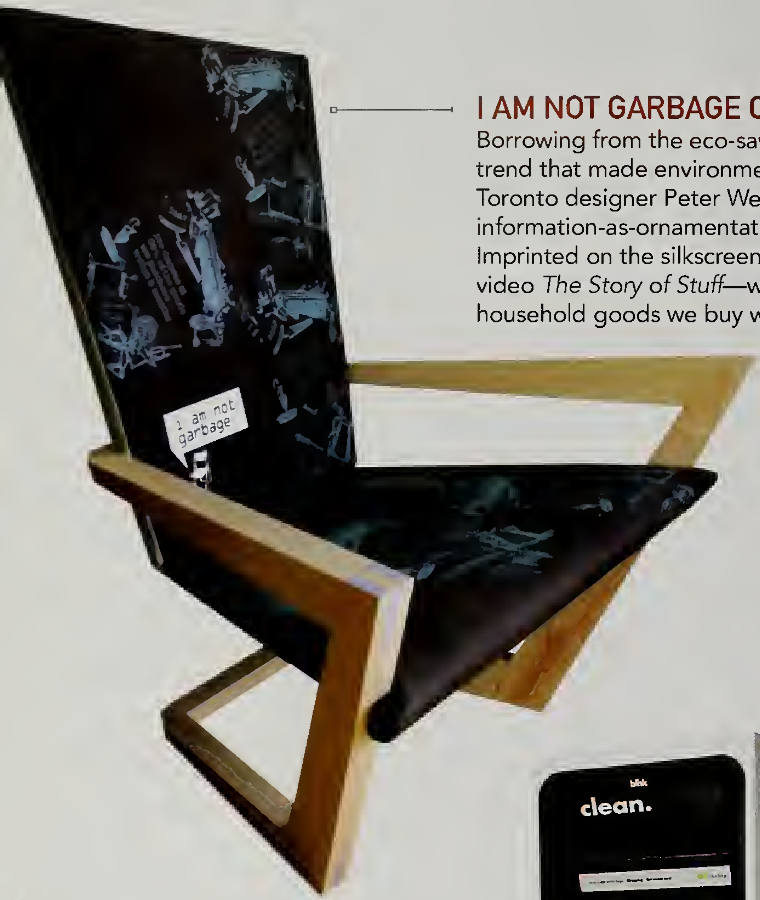
And the local government's reaction? "There seems to be some traction," says McCartney, "but this is a very young project."

—Paul Gessell

Students from the third-year class Urbanism in Practice II: Peripheries photographed on the second level of "The Pit" inside the architecture building at Carleton University: Soledad Carvajal, left, Nicole Moyo, professor Shelagh McCartney, Justin Spec, Taylor Marquis, Ghazi Shariff, Camille Baello, Meghan Murray, and Vanessa Abram. Missing from the photo, but also part of the project: Mustafa Arkadan, Jennifer Horvath, Carlos Portillo, Carlos Salgado, Julia Taucer, and Kristen Van Haeren.

DESIGN MINDFULLY

GRADUATES OF THE INDUSTRIAL DESIGN PROGRAM SHOW THE RESULTS OF THEIR WORK IN END PRODUCTS MEANT TO IMPROVE OUR WELL-BEING AND OUR SURROUNDINGS. A ROUNDUP OF NOVEL CREATIONS | WRITTEN BY DAYANTI KARUNARATNE



I AM NOT GARBAGE CHAIR

Borrowing from the eco-savvy I Am Not a Plastic Bag trend that made environmentalism a runway statement, Toronto designer Peter Wehrspann, MDes/12, continues the information-as-ornamentation element in this sleek chair. Imprinted on the silkscreened seat is a shocking stat from viral video *The Story of Stuff*—we dispose of 99 percent of the household goods we buy within six months.

BOTTLE OPENER PENDANT

Call it campfire couture—this stylish pendant by Vivian Cheng, BID/05, is modern and versatile. It opens beer bottles and looks good. The self-described "geek chic" founder of Blend Creations offers customized maps printed on stainless steel, sure to impress any microbrew connoisseur.

BLINK EV STATION

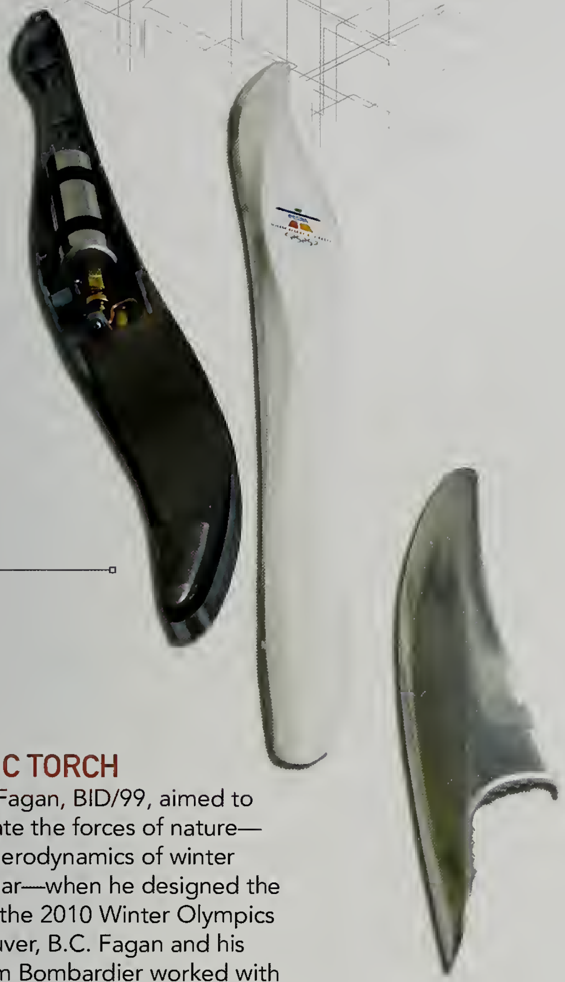
Appropriate for both commercial and residential locations, these stations move us one step closer to cutting our petrol addiction. Howard Nuk, BID/00, a designer in San Francisco, is now working to have these intuitive chargers installed throughout the United States; the plug-in experience includes feedback on the vehicle's energy consumption and the most inexpensive times to charge, all delivered via a smart phone app.

SPORTS BOTTLE

Bryce Rutter, BID/79, and his company, Metaphase Design Group, combine design and kinesiology to create ergonomic products that range from industrial sewing machines to safety glasses to medical instruments—but it's their iconic Gatorade bottle that most people will see. It singled out Metaphase as a company that combines good design with brand recognition and sensitive, touchable products.

TRAINING MODEL

The Actar D-fib training mannequin was designed by Dianne Croteau, BID/80, and Richard Brault, BID/82, and is the standard model used in cardiopulmonary resuscitation training around the world. Croteau and Brault co-founded Toronto's Studio Innova in 1983.

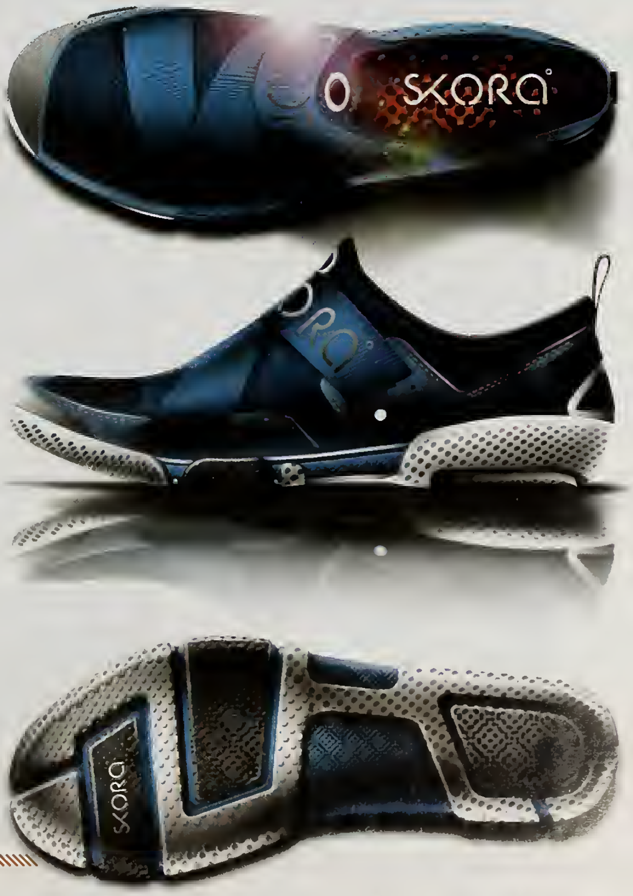


OLYMPIC TORCH

Timothy Fagan, BID/99, aimed to incorporate the forces of nature—and the aerodynamics of winter sports gear—when he designed the torch for the 2010 Winter Olympics in Vancouver, B.C. Fagan and his team from Bombardier worked with a different set of parameters: rather than a cauldron within the portable torch, for the first time the flame unfurled from a slice in the side of the instrument.

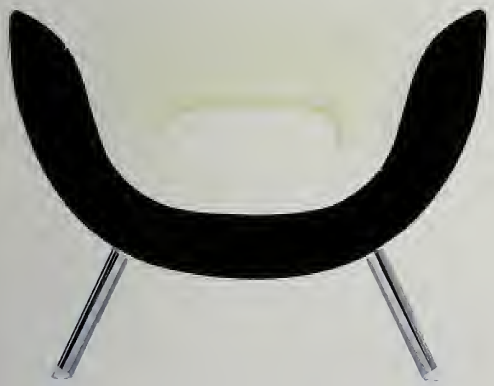
SKORA RUNNING SHOES

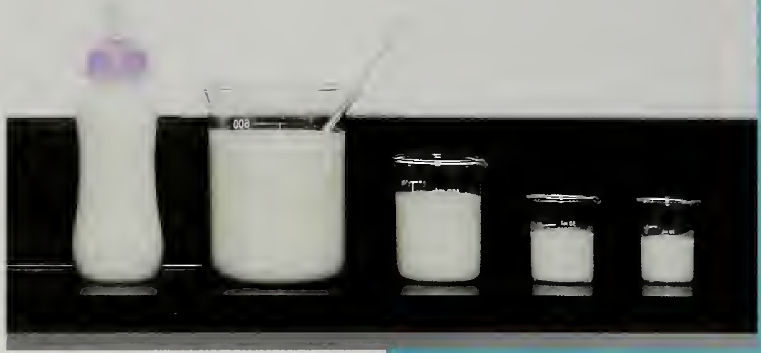
Skora footwear is billed as the "un-running shoe" because it feels much like running barefoot—but without all the hazards. The design encourages natural biomechanical movement. Toronto designer Richard Kuchinsky, BID/01, worked with master pattern makers and mould shops this past spring, leading the project from conception to market. It's receiving rave reviews from barefoot enthusiasts and tech geeks alike.



OH CHAIR

This simple stackable chair by Karim Rashid, BID/82, was an instant hit when it launched the Umbra furniture series in 1999. Named for the word you say when you sit down in this comfy chair—not to mention its accessible price point of $80—the design has since become a contemporary classic.





Professor Apollo Tsopmo in the food sciences and nutrition lab at Carleton University, where he has been working on a project for the past six years that could help premature babies.

Photo: Jessica Deeks

MAKE BETTER INFANT FORMULA TO HELP BABIES IN TROUBLE

Breast milk seems to protect babies against some of the effects of what scientists call "free radicals"—unstable atoms and molecules in the body that can damage cells. But just what is it in breast milk that does that?

If scientists could figure out the answer and apply it to infant milk formulas, it could be especially useful for premature babies. Such babies often receive lifesaving oxygen therapy that can, as an unwanted side effect, lead to the formation of free radicals.

Answering that question has intrigued Apollo Tsopmo for the past six years. Tsopmo is a professor in the food science and nutrition program of Carleton's chemistry department, and he is trying to isolate the antioxidant molecules in breast milk that can neutralize free radicals.

His research starts by using enzymes to break down a sample of breast milk, mimicking the digestion going on in a baby's gastrointestinal tract. Then he uses one of several methods to separate the "digested" sample into fractions. For instance, he might use a cascade of membranes to divide the sample into smaller portions, each with a different molecule size. "Then we evaluate them for the activity we are interested in," he says.

His ultimate goal is to find the components in breast milk that combat free radicals and then synthesize those antioxidants and add them to baby formula.

"We are looking for something that can take care of the extra oxygen that is not used, and then that will reduce some damage to lungs," Tsopmo says.

—Laura Byrne Paquet

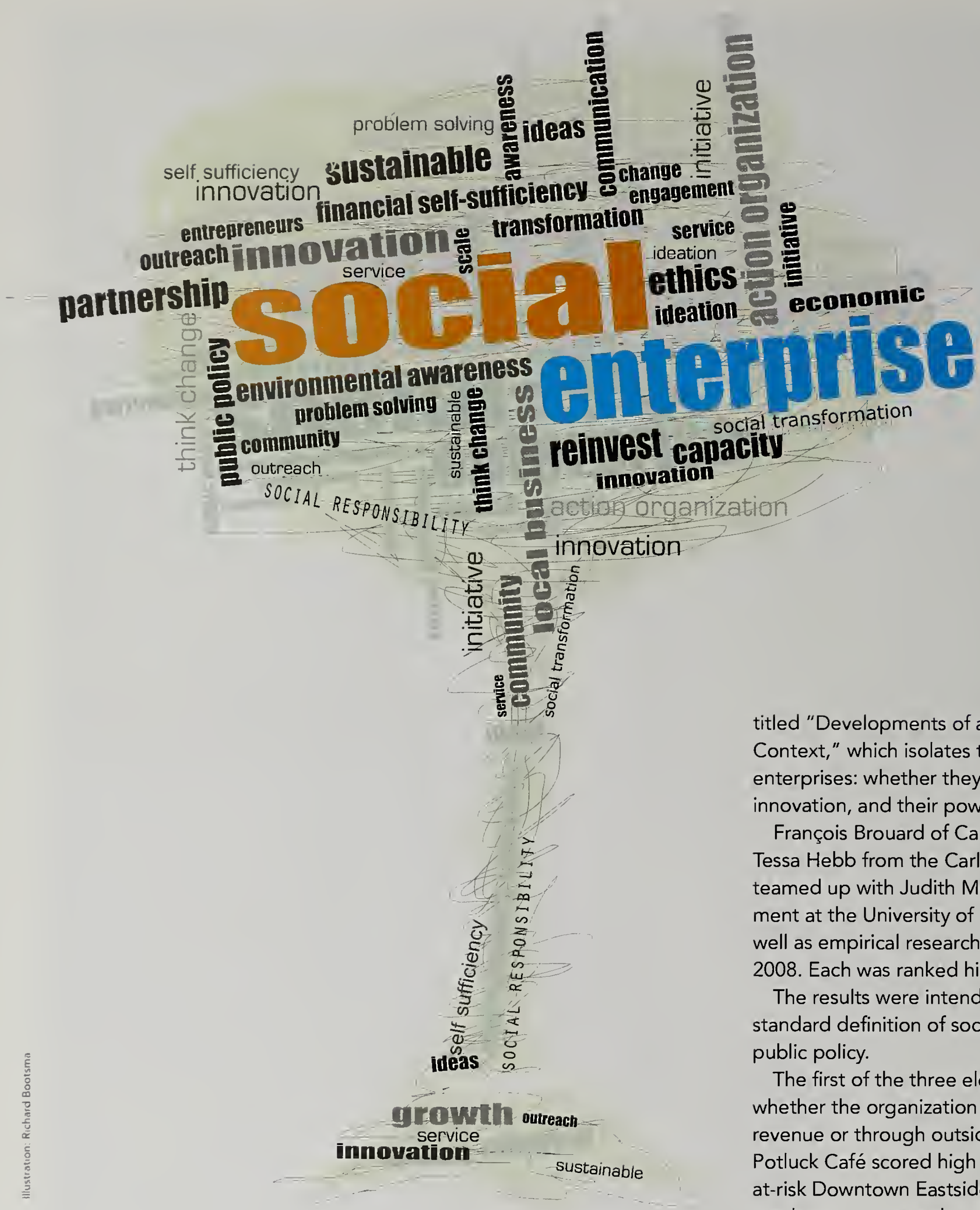


Illustration: Richard Bootsma

MEASURE HOW WELL SOCIAL-ACTION DO-GOODERS ACTUALLY DO

Social enterprises are organizations that, roughly speaking, operate on a business model to achieve social good. Think of One Change, founded in 2005 by Stuart Hickox, BA/92, to hand out free compact fluorescent light bulbs in Ottawa neighbourhoods. It has mushroomed into an environmental awareness and action organization operating in both Canada and the United States.

But what exactly is a social enterprise, and how, in an area rife with good intentions and sometimes vague goals, can its effectiveness be measured?

Definitions vary, but a team of researchers has published a paper titled "Developments of a Social Enterprise Typology in a Canadian Context," which isolates three elements to help assess most social enterprises: whether they are financially secure, the degree of their innovation, and their power to bring about social transformation.

François Brouard of Carleton's Sprott School of Business and Tessa Hebb from the Carleton Centre for Community Innovation teamed up with Judith Madill from the Telfer School of Management at the University of Ottawa to conduct literature reviews, as well as empirical research, into 60 Canadian social enterprises in 2008. Each was ranked high or low in each of the three elements.

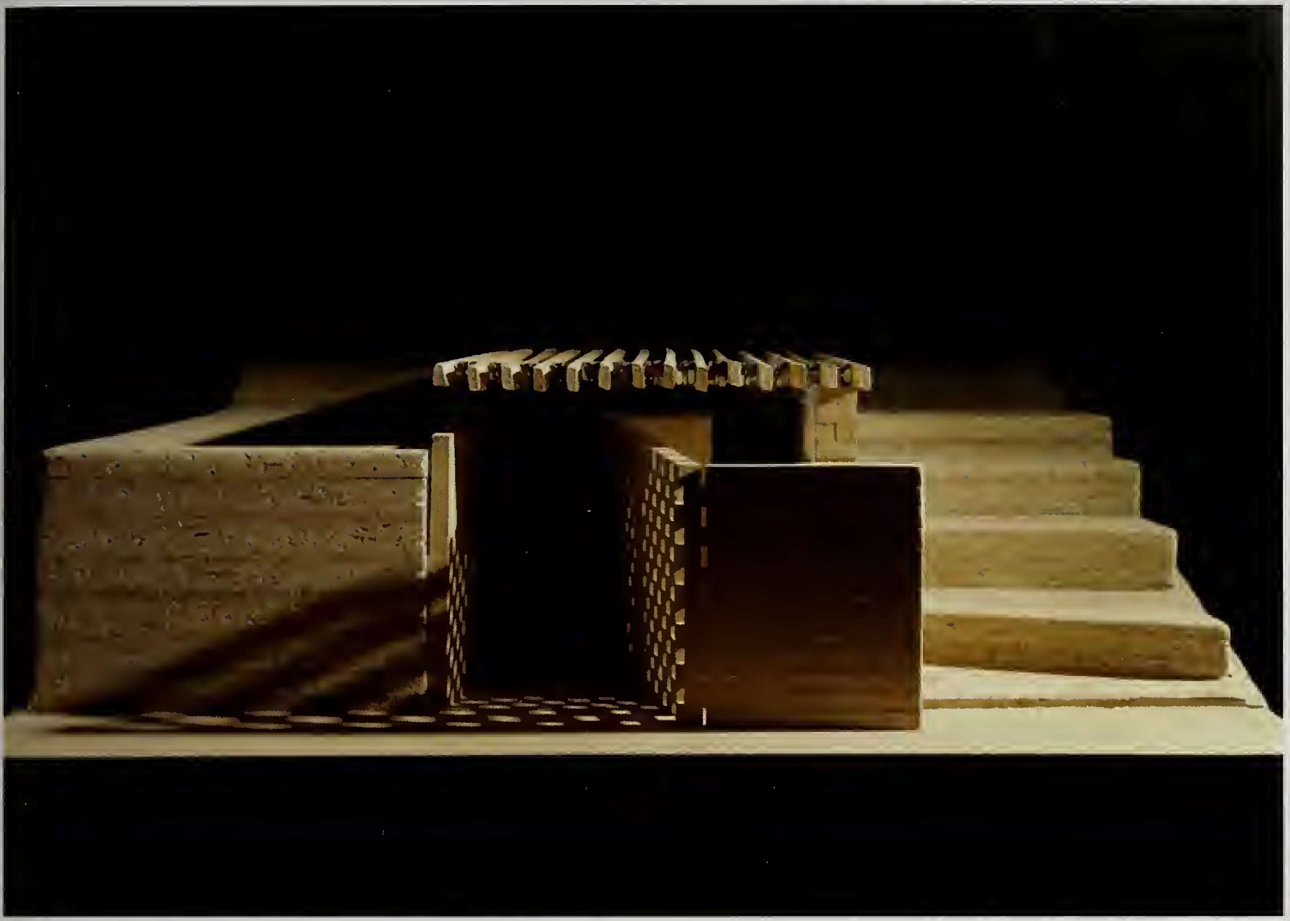
The results were intended to aid in developing both theory and a standard definition of social enterprise. Those, in turn, would inform public policy.

The first of the three elements was money. The team asked whether the organization covered most of its costs by generating revenue or through outside funding. As an example, Vancouver's Potluck Café scored high by bringing in enough income to employ at-risk Downtown Eastside residents and to sell nutritious, cheap meals to customers short on cash.

Innovation, the second element, proved quite tricky to assess. An example was Vancouver-based Landscape with Heart, a lawn and garden maintenance business that seemed innovative for providing jobs for people nobody wants to hire. However, if many other such companies exist, this one is not so innovative after all—the kind of conundrum the researchers often faced.

The third element, social transformation, measured results. One example, founded in Canada in 1989, was Street Kids International. The team rated it high for transforming the lives of over two million homeless children through efforts like job skills training. Other organizations might focus on transforming the lives of fewer people but, being successful, still garner a high rating.

—Patrick Langston



Lucas Boyd's model of the Bathroom Pavilion, drawing from the idea that we dwell in two worlds. "Our social interaction shares an inverse relationship with that of our private being, and we are continuously travelling from one to the other," he writes in an artistic statement about the project.

USE PUBLIC FACILITIES TO FACILITATE PRIVATE MOMENTS

When Yorkshireman Thomas Crapper popularized the modern flush toilet in the mid-19th century, he did not, in all likelihood, see his handiwork as a seat of quiet contemplation. But Lucas Boyd, a Carleton architecture student, does. The humble toilet sits at the centre of an exercise in "imagineering"—a process of imagination and engineering—that Boyd calls the Bathroom Pavilion.

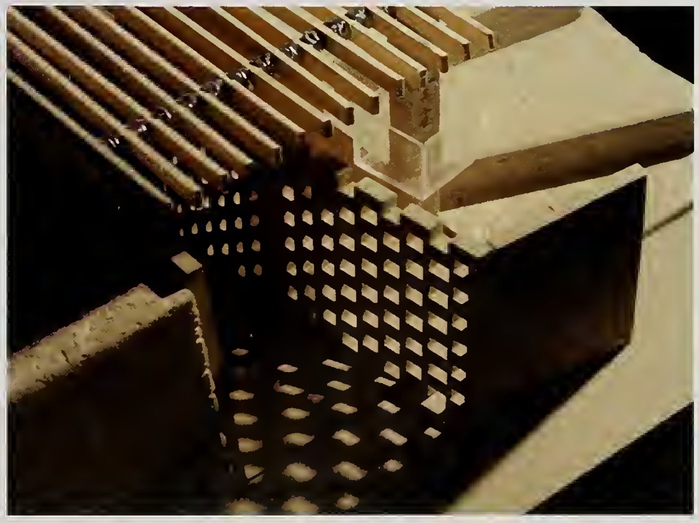
It was part of a class exercise that focused on the arboretum area of Ottawa's Central Experimental Farm. Winter and summer, the arboretum is a popular spot with adults and children sitting and strolling, sliding and rolling, and occasionally in need of a loo.

"What I wanted to do was juxtapose the super-public with the super-private," Boyd says, "because in our culture, going to the bathroom is pretty much the most private thing you can do."

So he created a maquette of a roofless structure complete with fireplace. Needy patrons, drawn by the sounds of streaming water amplified by the horn shape of the entrance and by the concrete walls within, can descend to its lowest point. There, temporarily insulated from the human bustle outside by the sounds of running water, they can sit under a canopy of translucent glass on the site's solitary toilet and ponder the universe in private.

"For me, it's about transforming a totally mundane experience into a moment of reflective thought," Boyd says. "Maybe they'll think of some great ideas in there. Maybe they'll find God."

—David McDonald



A close-up view of the pavilion, with the entrance at one side and a sloping laneway that leads to a fireplace. The noise of water from a constantly flowing stream encourages reflection.

CHANGE YOUR ETHOS FROM DIY TO DIO

Janak Alford's graduate thesis concluded that the tools we use to build or manufacture things affect the output. So if you were tasked with decorating a room and were given scissors, you would have a different result than if you used a glue gun, say.

It got him thinking about how he could apply that concept in the working world—which led him to establish a new collaborative working space and a new twist on an old philosophy.

Last September, Alford, BArch/09, MArch/11, rented a basement space on Bank Street in Ottawa and christened it Prototype D. Inside, there are three workrooms, a common area, and a green screen production room that members of the co-operative can use at their leisure. A laser cutter, an engraver, a 3-D printer, drill presses, scroll saws, and hand tools are available for use by the members.

"We have the tools to build basically anything," Alford says. "I can do architectural design here, develop software, make physical things, or film movies. It's a multi-purpose space: you occupy it, you use it, you clean it up, and you put it back."

It's a 2.0 take on the do-it-yourself (DIY) movement that grew out of the punk scene, whereby adherents, in protest of the dominant consumer culture, would rely on their skills and those of their friends to affect the culture by, say, publishing zines. These days, the new thinking is DIO, or do-it-ourselves, Alford says.

"It's the idea that you can get together for an idea that's socially good—where professional people work together in new and dynamic ways—because you're not the only one with a crazy idea."

Prototype D facilitates that way of thinking. Alford describes the place as a collaborative design studio—an important role in a changing economy where people have both day jobs and secondary gigs.

"Collaboration is going to be rethought over the next couple of years because people have things they want to do outside of their professional lives. If you want to work out, you go to the gym. If you want to shop, you go to the mall. But where do you go if you want to make something? People need a space where they can collaborate with other people."

—Fateema Sayani

Janak Alford lounges in the green screen room of Prototype D, an "urban workshop" in Ottawa. The cast-off couch, repurposed trash bins, and dated technological hardware aren't solely decorative; they are evidence of the tinkering spirit of the members of the co-operative who create new hardware and new business ideas inside the collaborative working space. At left: Inside one of the workshops, where members have access to power tools and have a space to make a mess as they carve out new concepts.

Photo: Luther Caverly

GET YOUR
WORKSHOP
ON. 601BANK
pD

Photo: Rémi Thériault

CREATE BRAINY MODELS—IN 3-D—IN ORDER TO SHED LIGHT ON PUZZLING DEGENERATIVE DISEASES

Say "architecture," and people are likely to think of complex structures of steel and glass that stretch into the sky. Nicolas Valenzuela, facing page, who studied architecture at Carleton, is indeed interested in complex structures, but on a smaller scale. No, not bungalows. Smaller. Much smaller. Think molecular.

Valenzuela, a post-professional research fellow with the Carleton Immersive Media Studio, is part of an unusual team of researchers from various fields and institutes who are hoping to gain new insights into the roots of neurological diseases, such as Alzheimer's and Parkinson's.

His role is to help a slew of "ists" (neuroscientists, chemists, biologists, other-ists) understand one another. He is doing that through three-dimensional imaging.

"I want to help them all communicate and speak a common language," says Valenzuela.

To understand degenerative diseases of the brain, it is necessary first to understand how its molecular structures change over time. And to understand that, accurate graphical models of those structures are needed. Valenzuela uses 3D-imaging software to create models of lipids, important molecules that make up the membranes surrounding brain cells.

"There was almost nothing out there for lipids, which are tiny little structures," says Valenzuela. "They were typically drawn as a ball with two legs."

By integrating detailed information about the atomic structure of lipids into his imaging process, Valenzuela is working to create a more accurate visual representation of brain cell membranes. He is combining his work with that of a colleague in physics to animate his models. The result would enable researchers to simulate how lipids respond under different conditions, which could shed light on how changes to brain cell membranes make people vulnerable to disease.

"I would love to see a membrane that is structurally accurate," says Valenzuela. "I would like to see a highly detailed model that represents this complex structure, as opposed to a ball with two sticks."

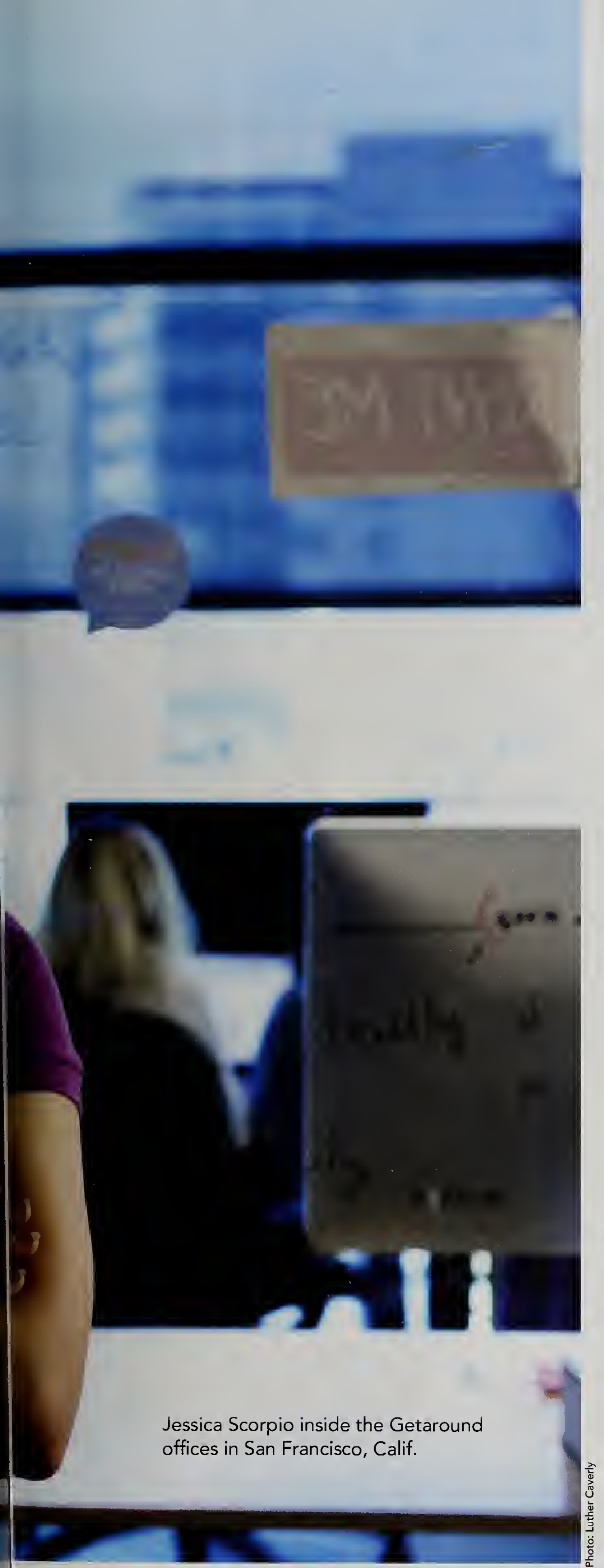
—Roger Collier

These are examples of Valenzuela's work, which melds a highly technical* process with a thoroughly artistic output. The image above is a representation of a retrograde synaptic transmission, while the image at right is a representation of lipids in the membrane of a protein-deficient mouse.

* *For those versed in the field, here are extensive descriptions:*

vesiclePackaging, left: Representation of retrograde synaptic transmission wherein the PAF family of lipid second messengers, released from the post-synaptic neuron following receptor activation, traverses the synaptic cleft to interact with the pre-synaptic neuron.

synapticPlasmaMembrane, above: Representation of phospholipids in the synaptic plasma membrane of an apolipoprotein E deficient mouse.



Jessica Scorpio inside the Getaround offices in San Francisco, Calif.

Photo: Luther Caverly

USE ENTREPRENEURIAL SMARTS TO MAKE A DIFFERENCE: A LOOK AT SAVVY BUSINESS IDEAS

Would you trust a stranger to drive your car? If so, you may be the perfect customer for Getaround, a San Francisco-based car-sharing company co-founded by Jessica Scorpio, BAHons/09. Members use a website or smartphone app to rent fully insured cars from other members for $3 to $75 an hour.

Dawn Wintour, BID/06, spent a year honing her industrial design chops in the design department of Ikea in Sweden, where she created a line of flatware. Next, she founded Akeru Industrial Designs, through which she has designed tools, housewares, and other products for clients such as Umbra.

Keeping municipal governments transparent and ethical is the goal of public policy and administration doctoral candidate Christian Bordeleau. His Montreal-based company, Intangible Gouvernance, studies city governments scientifically. If they meet a wide range of good governance criteria, the firm certifies them to its IGO (indicators for governance in organizations) standard.

Download Elias Majic's free Ottercall iPhone or iPad apps, and you can brush up your Spanish or French pronunciation anytime. Majic, currently studying for his MEng in technology innovation management, founded Ottercall in 2010. He also creates custom language software for such clients as the Royal Saudi Air Force.

Clients using software by Nuket Nowlan, MASc/11, may look as though they're playing a super-realistic video game, but they're actually learning career skills. Through her two-year-old company, 3D Virtual Crafting, Nowlan creates learning software that simulates real-life situations—such as a domestic violence simulation that helps new social workers learn how to respond.

Doctoral candidate Kostyantyn Khomutov, BEng/07, MASc/09, is also CEO of Smart Rotor Systems, whose patented technology reduces both noise and vibration produced by helicopter rotors. That makes for both a smoother ride and decreased costs—helicopters equipped with the technology will be up to $100,000 cheaper to run annually.

If you've designed a battery and want to make sure it works safely, Mike Farrington, BA/77, and Judy Lockwood, BScHons/80, can help. In its custom-built facilities, Farrington, Lockwood Company Limited has been conducting dangerous specialized testing of both lithium and chemical batteries for more than 25 years.

Former provincial figure-skating champion Valerie Nicholls, BScHons/10, drew on both her competitive sport background and her neuroscience studies at Carleton to create Actin Fitness, an Ottawa training company whose workouts focus on both brain and body. Clients range from the New Democratic Party to a retirement home.

—Laura Byrne Paquet

Photo: SNOLAB

Photo: Brigitte Bouvier

DIG DEEP UNDERGROUND TO DECIPHER HOW THE UNIVERSE HOLDS TOGETHER

"Dig it and they will come" could be the tagline for SNOLAB, the world-leading research centre for particle physics and astrophysics created by efforts that included a leading role by Carleton.

SNOLAB is one of a handful of deep underground facilities recently built around the world. It is a protected place where scientists can install specialized detectors to study the intricate gyrations of subatomic particles, such as neutrinos, and also to investigate dark matter, the substance believed to make up 25 percent of the mass of the universe.

This research is aimed at understanding how the universe holds together and whether and how supernovas created all the chemical elements heavier than iron.

With an area slightly larger than three standard NHL rinks, more than two kilometres underground near Sudbury, SNOLAB is the deepest of all such underground facilities—and the cleanest. Although the lab branches off from a working nickel mine, an intricate system of filters and air locks keeps it as dust-free as a microchip factory.

Such extreme lengths are necessary because the particle collisions that researchers are studying produce such weak signals that they are easily swamped by a cacophony of noise from cosmic rays and natural radioactivity above ground.

Carleton oversaw the removal of 83,000 tonnes of rock to transform the original Sudbury Neutrino Observatory into SNOLAB, which provides free space to researchers based on the merit of their experiments. The $65 million cost also included a research centre on the surface.

—Peter Calamai

David Sinclair, professor of particle physics at Carleton, received the Canadian Association of Physicists' TRIUMF Vogt medal last May for his work on the study of neutrino physics in the pioneering Sudbury Neutrino Observatory lab. He's shown here in the lab, which is located two kilometres underground in the Vale Inco Creighton Mine.

Project leads Jennifer Evans, left, Josh Greenberg, and Shawn Graham with grad students Erica Fagen and David Cranswick inside the history lounge at Carleton University.

Photo: Luther Caverly

FIND OUT HOW SOCIAL MEDIA CHALLENGES THE HATE MERCHANTS

"Politics doesn't always happen in Parliament or even in demonstrations anymore," notes Carleton history professor Jennifer Evans. "So I think it's interesting to consider such ordinarily banal spaces as Flickr and Twitter as political spaces. More and more, they've become important for political opposition and political change."

With a major grant from the Social Sciences and Humanities Research Council, Evans and her Carleton colleagues Christiane Wilke, a legal scholar; historian Shawn Graham; and sociologist Josh Greenberg have embarked on a two-year project called "Hate 2.0: Combating the Radical Right in the Age of Social Technology."

Evans and her collaborators will examine the ways social media are being used to combat neo-Nazism and other radical-right strains of thought in Germany and Canada.

"A lot of this is kind of make it as you go," says Evans, an academic envelope-pusher best known for probing into the history of sexuality (*Life Among the Ruins: Cityscape and Sexuality in Cold War Berlin*).

"To this point, my historian brethren haven't taken seriously that social media can actually be a historical force for these kinds of questions. It's too new, it's too fleeting, maybe too popular. So that got me thinking there's a project that needs to be done—one that could be expanded in a number of different ways."

—*David McDonald*

Illustration: Richard Bootsma

CHANGE THE SYSTEM: MANY "ANTS" MAKE MUCH WORK AND PROVIDE A SOLUTION FOR ECONOMIC WOE

Recent job cuts by the federal government hit the national capital region hard. So did the high-tech-sector meltdown in 2002, the global economic collapse in 2008, and the demise of Nortel in 2009. Through it all, professor Tony Bailetti has been using a business ecosystem approach to stimulate economic growth in the Ottawa region.

Forget the big-company-doing-it-all, top-down business model. "A large number of diverse entrepreneurs can do more for our region with less," says Bailetti. He suggests "ants": many small companies united by a common platform in a decentralized business ecosystem.

That platform unites various functions in industries by promoting transactions between members of the ecosystem and by sharing resources, including funding, mentors, and open-source technology.

As each ant goes about its business, it draws what it needs from the labour of others in the system and contributes in kind. The number of ants and their interconnections could create a healthy and robust ecosystem—if one particular company fails, the damage to the system is lessened.

Drawing on his dual expertise as a professor in the Sprott School of Business and the department of systems and computer engineering, Bailetti launched his business ecosystem in 2002 to help retain tech jobs in the national capital region. He created and self-funded Lead to Win, a free platform to help entrepreneurs. After participants develop their ideas into a business opportunity, with mentoring and resources from Lead to Win, they grow their business with the goal of creating six new jobs in three years.

The program's first cohort of 29 people from 2002 was involved in founding 15 businesses that created more than 300 jobs in Ottawa and attracted $90 million in investment. Tech companies that were fledglings at the time, like network-integrity specialists Nakina Systems, are still going strong, along with Liquid Computing and Purple Forge. Today, Lead to Win has helped more than 350 entrepreneurs launch and grow businesses and is backed by the National Research Council's Industrial Research Assistance Program, the City of Ottawa, Invest Ottawa, the Ottawa Chamber of Commerce, the Ontario Talent First Network, and the program's 2002 alumni.

Lead to Win has evolved from its tech roots into multiple economic sectors. Bailetti is currently planning ways to utilize the diverse talents of former civil servants and set them on the road to creating companies as he did with the tech sector.

—*Amanda Couch*

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